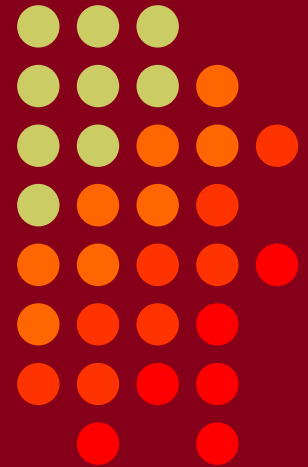


CTU Presents

Contest Applications of CW Skimmer
and the Reverse Beacon Network

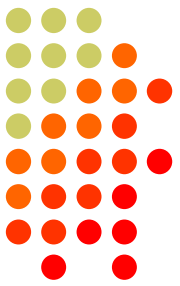
Pete Smith N4ZR



• CTU •
CONTEST
UNIVERSITY

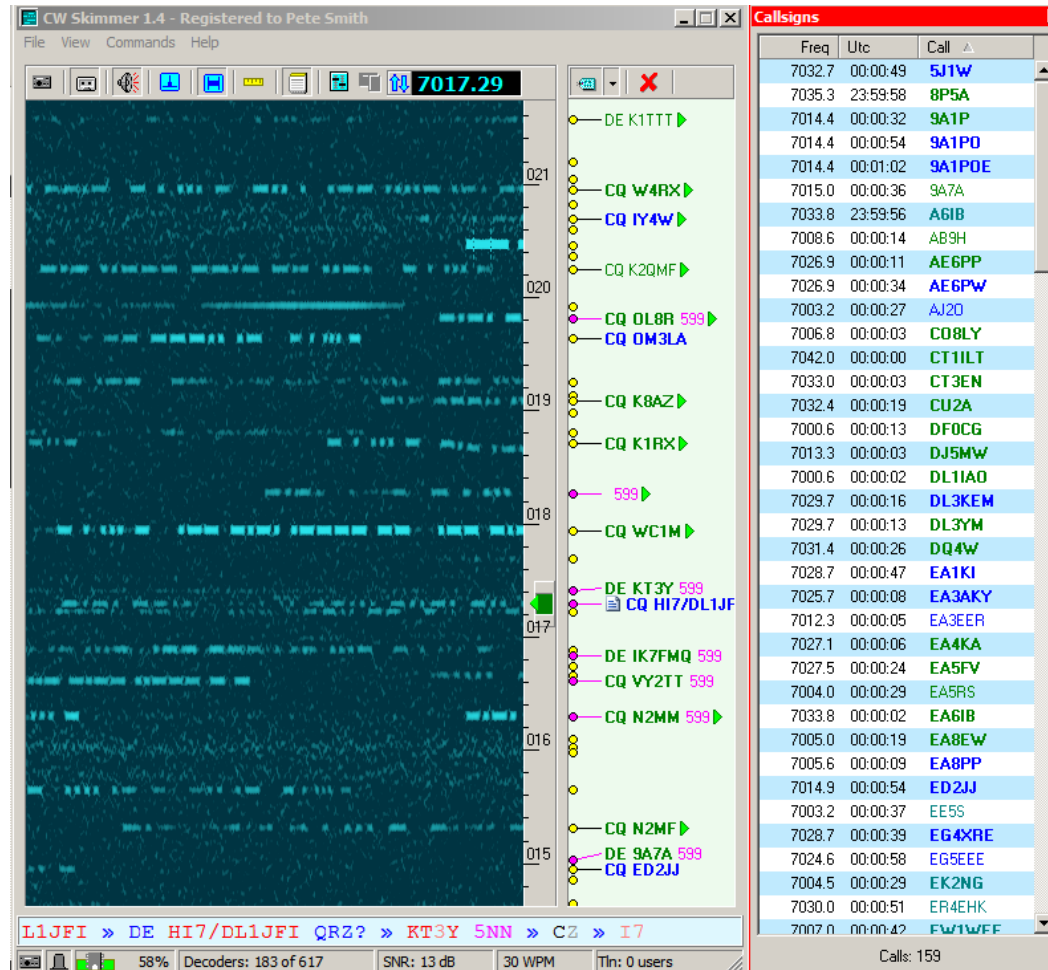
ICOM

What is CW Skimmer?



- Windows software, originally released in 2008 by Alex Shovkoplyas, VE3NEA; US\$75 for very flexible license
- Intended mainly as a DXing tool rather than for contesting
 - automatically copies all the calls in a pileup and flags the one who gets through
 - click on him and move your radio to that frequency

What can you copy in a minute and a half?





“Deployment” Options

- 3-KHz radio mode
 - Uses transceiver audio via sound card
 - Limited to 3 KHz bandwidth provided by radio
 - Mainly a “demo” mode

Softrock



- Simple SDR kitted by <http://KB9YIG.com>
- 96 KHz bandwidth, determined by sound card
- Requires gain and phase correction to avoid images – CW Skimmer provides
- Single-band and multi-band versions available - \$15-56 in kit form

Typical Sound-card-based SDR

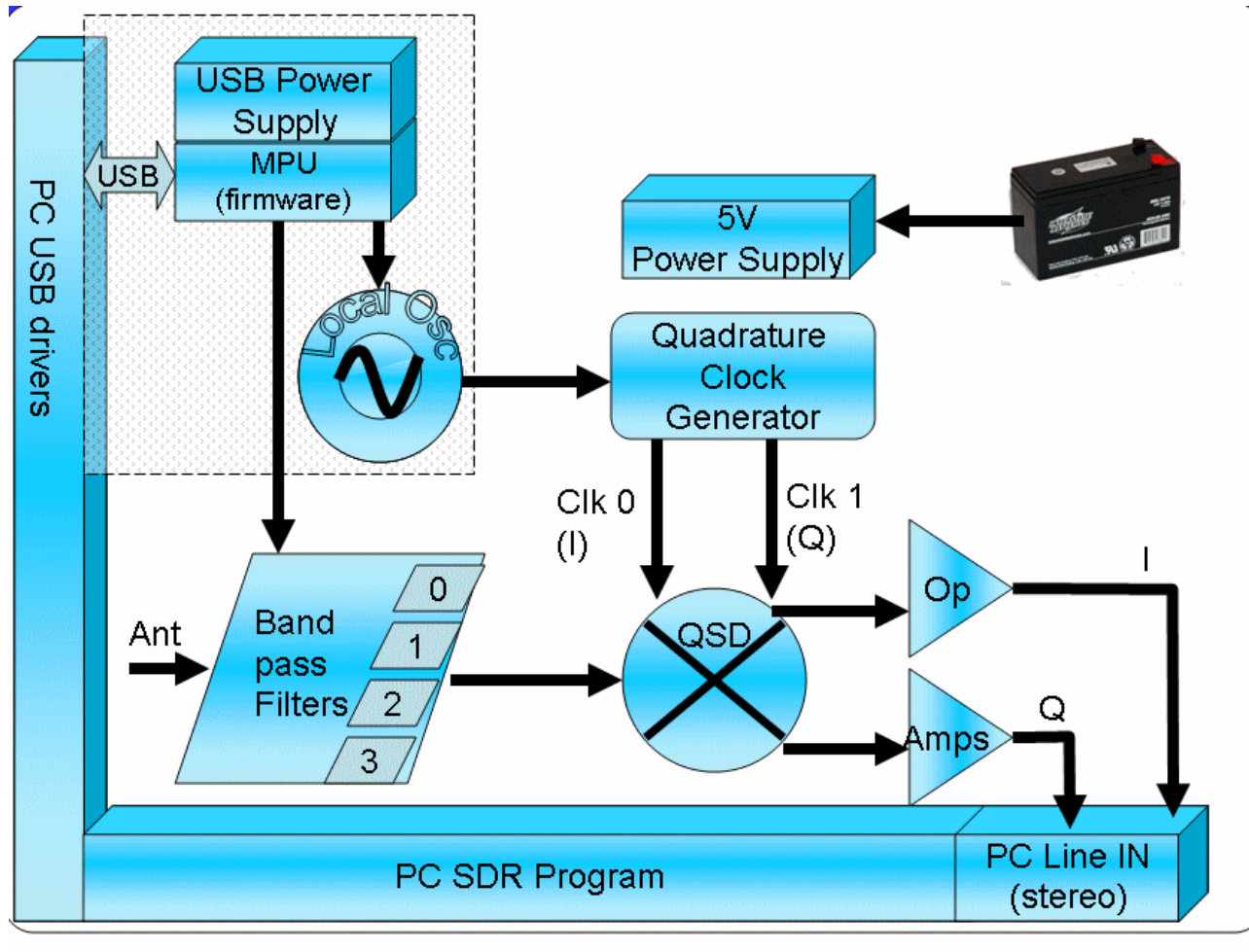
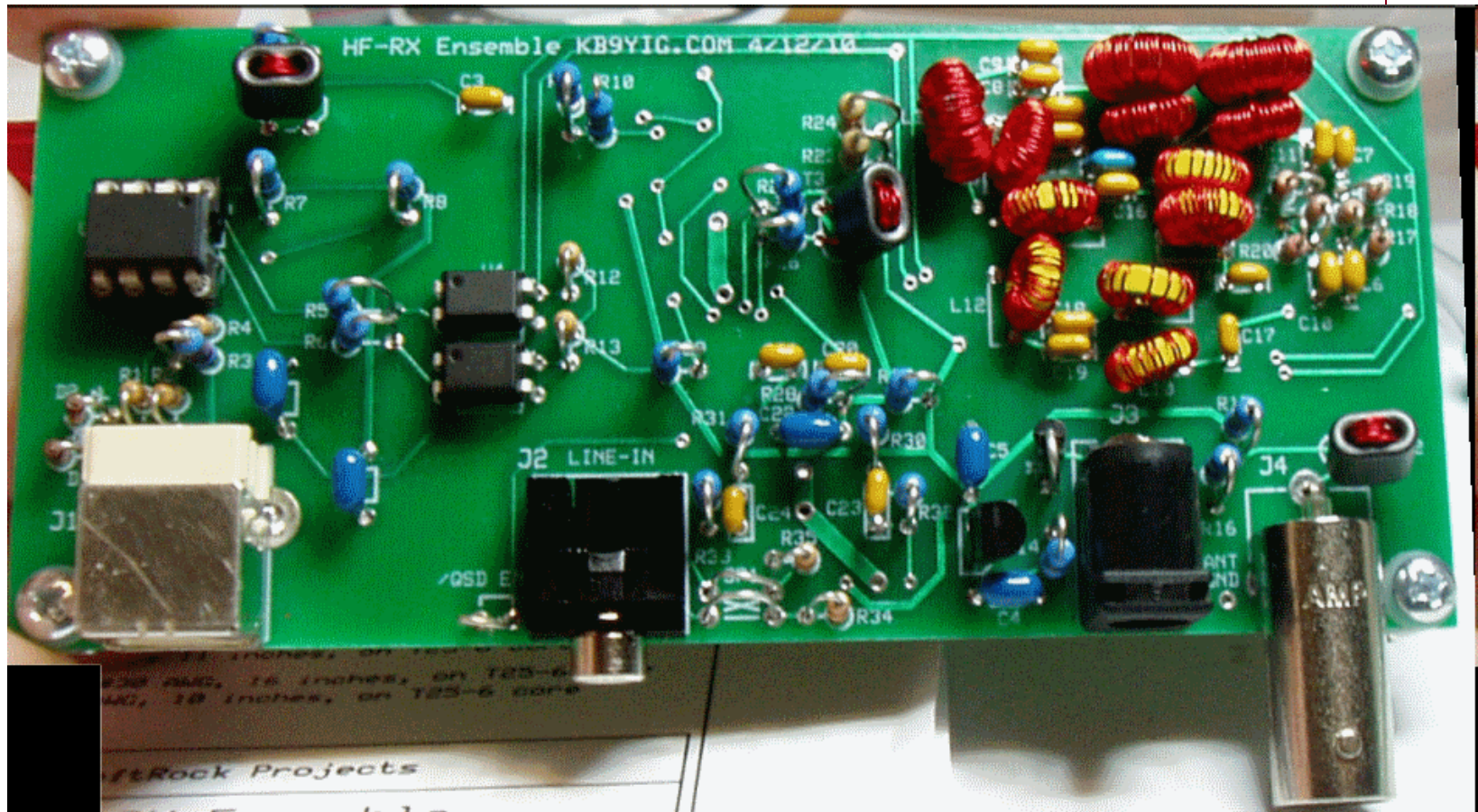


Diagram courtesy WB5RVX

Softrock RX Ensemble II 1.8-30 MHz



Softrock-IF



- Uses Softrock (or other SDR), tapping IF of station transceiver.
- Covers 24-KHz bandwidth centered on transceiver frequency
- Requires CAT; center frequency control via Telnet
- Same image issues

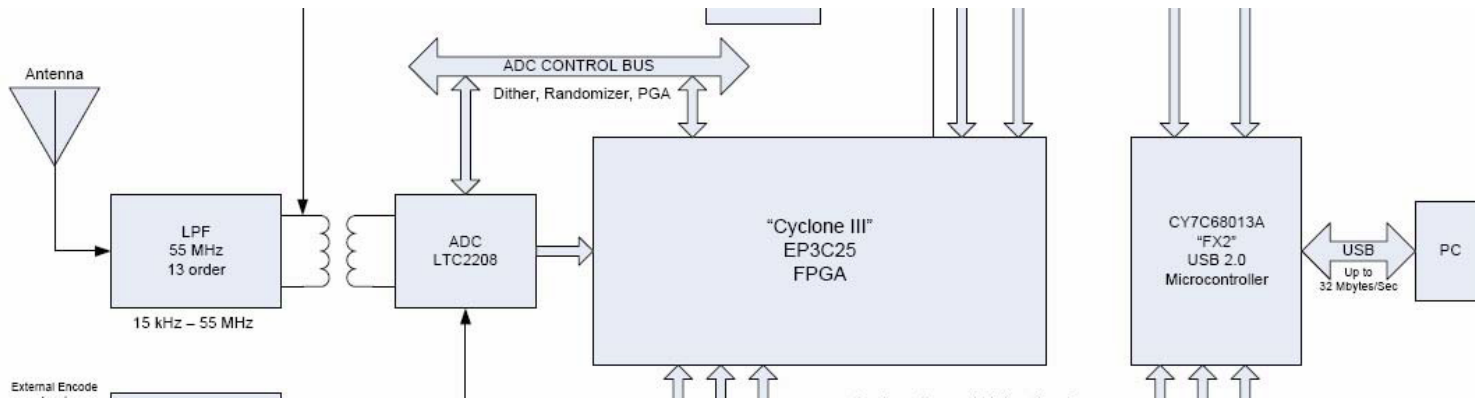


Stand-alone SDRs

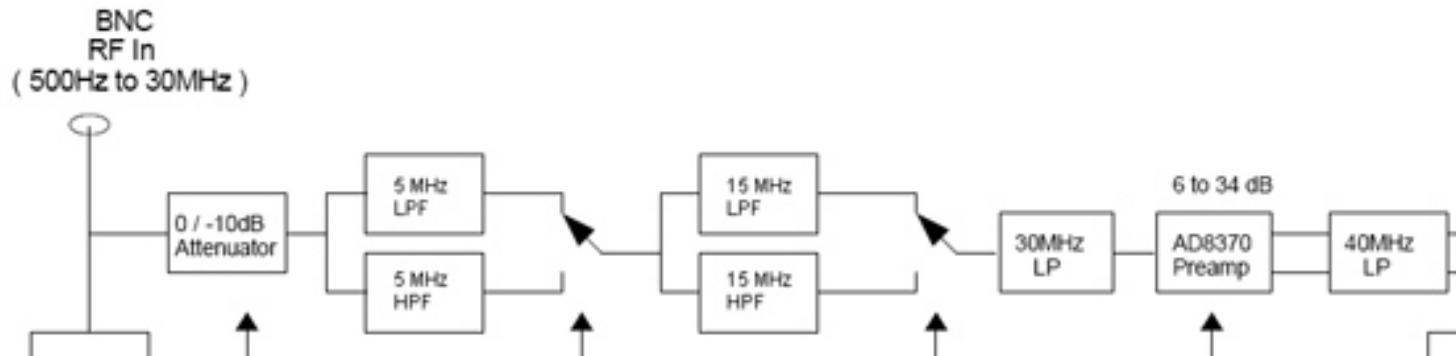
- Mercury HPSDR
 - Supported by CW Skimmer, but availability currently uncertain
- SDR-IQ
 - Band-switching, up to 196 KHz/band, 500 Hz – 30 MHz; uses Spectravue or CW Skimmer
- QS1-R
 - With SkimSrv, 7 x up to 192 KHz bands simultaneously, including 6M; uses SDRMAXII or CW Skimmer



Two Different Approaches



Partial QS1-R block diagram courtesy N8VB



Partial SDR-IQ block diagram courtesy Pieter Ibelings and RFSpace, Inc.

Antennas



- Option 1 – share RX antennas with station radios
- Option 2 – dedicated antenna

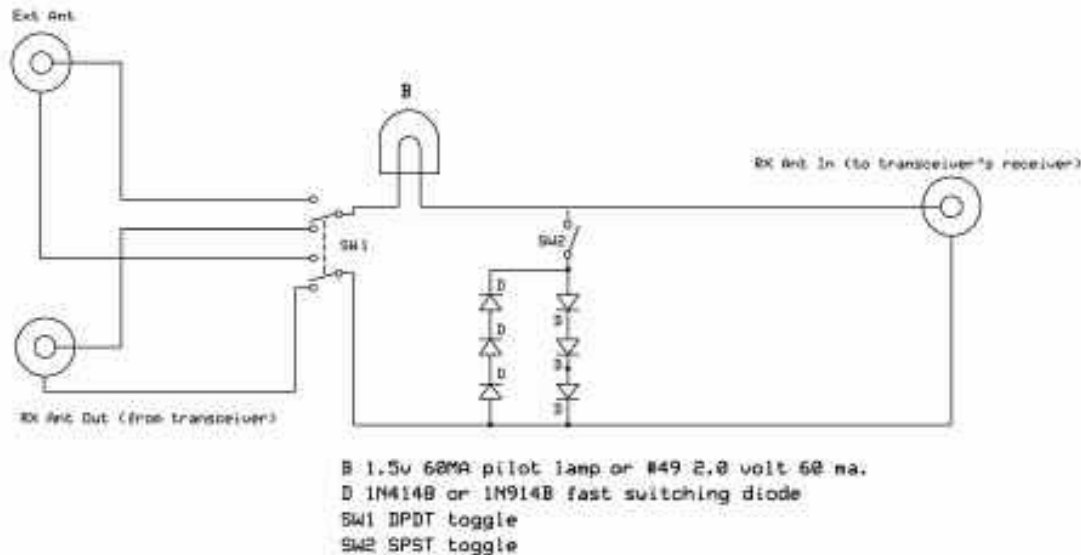


Practical Hardware Issues



- RX gain and in/out of band strong signal handling
- TX RF leads to busted spots
- Expensive silicon needs protection
 - Receiver protectors – 1.4 volts or less
 - The best solution - Disconnect/ground SDR antenna when transmitting

An Example of a Protector



- Diodes can cause intermodulation
- Basic problem with SDRs is voltage, not power, so bulb as fuse may not act quickly enough

Receiver Protector Options

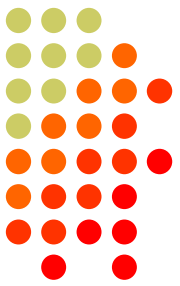


- “Fuse” - #47/49 bulb
- Back to back diode strings shunting the antenna to ground – 2 x 1N914s each way
- Series capacitor(s) to block DC
- Gas tube – lightning only

VK1LW's QS1-R “beacon”



Telnet



- Added to CW Skimmer in early 2008
- DX Cluster format accepted by all logging programs – typically Skimmer spots flagged with - #
- Simple server, accepts a few commands
- Adjustable callsign validation level

Callsign validation



- 4 levels – minimal, normal, aggressive and “paranoid.”
- Applies multiple criteria and “tell me again ... and again.”
- “Paranoid” uses standard master.dta file

Local Skimmer in Contests



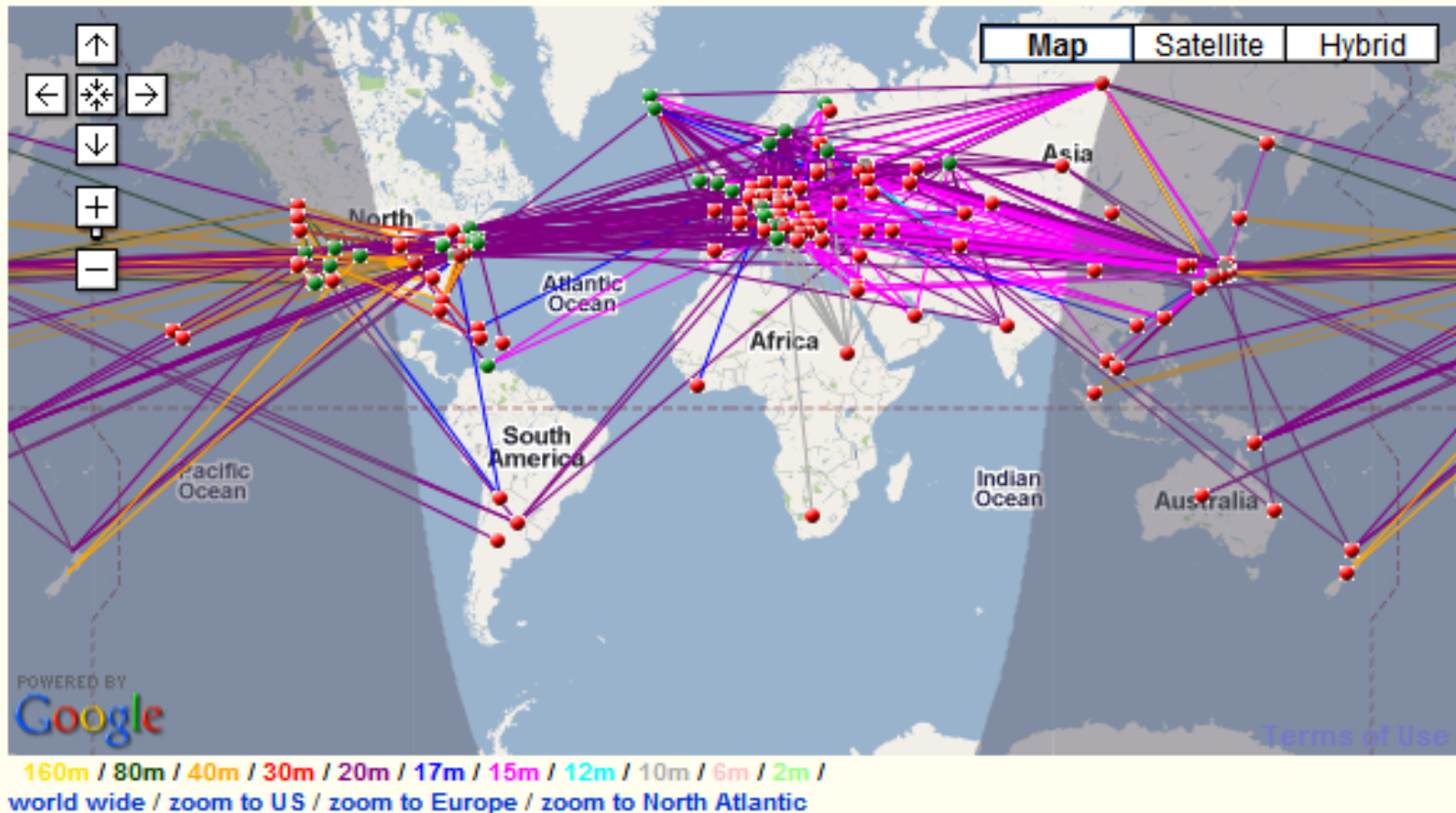
- Even with SO2R will generate many, many spots
- Multi-ops have a problem
- The off-site solution, and how to keep it legal

The Reverse Beacon Network



- Original idea by Felipe, PY1NB in March 2008
- He wrote “aggregator” software to transfer spots from individual CW Skimmer/SkimSrv “beacons” to a central database
- Combined spot stream archived and displayed at <http://reversebeacon.net>

Propagation at a glance



Filtering



REVERSE BEACON NETWORKSSN:83 SFI:113 A:7 K:2callsign lookup:

welcome | main | dx spots | skimmers | downloads | about | contact us

create your filter, or choose one on the list at the right side of the screen >>>

	DX station	DE station	band	mode
dxcc:	<input checked="" type="radio"/> any	<input checked="" type="radio"/> any	<input type="checkbox"/> all	<input type="text" value="any"/>
itu zone:	<input type="radio"/> any	<input type="radio"/> any	<input type="checkbox"/> 137kHz	
cq zone:	<input type="radio"/> any	<input type="radio"/> any	<input type="checkbox"/> 160m	
continent:	<input type="radio"/> any	<input type="radio"/> any	<input type="checkbox"/> 80m	
			<input type="checkbox"/> 60m	

the DX station column refers to the station which is being spotted.

the DE station column refers to the station where the spot comes from.

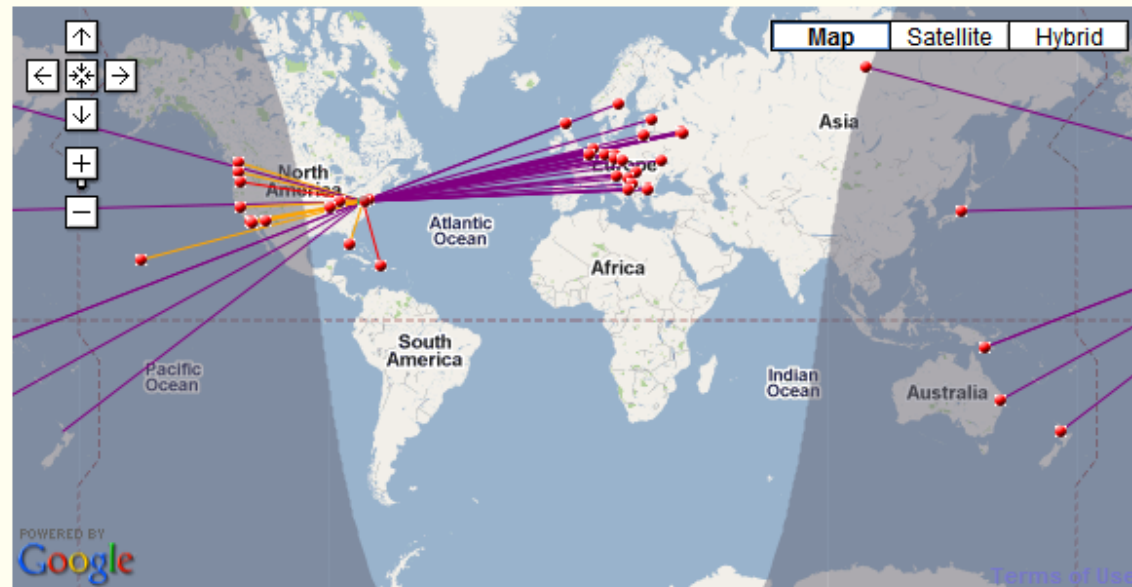
my last filters:

- DE cq zone: 5 - eastern zone of NA
- DE cq zone: 4 - central zone of NA
- DE continent: NA - North America
- DE cq zone: 14 - western zone of EU
- DE cq zone: 3 - western zone of NA
- DE = IK3 STG

ready made filters

- HF last 50 HF
- 137kHz HF/CW
- 1.8MHz HF/SSB
- 3.5MHz
- 5MHz 1.8/3.5/7MHz
- 7MHz 14/21/28MHz
- 10MHz 10/18/24MHz
- 14MHz
- 18MHz
- 21MHz
- 24MHz
- 28MHz
- VHF+ VHF+/CW
- 50MHz VHF+/SSB
- 70MHz
- 144MHz
- 430MHz
- 1.2GHz

Who is W3LPL hearing?



160m / 80m / 40m / 30m / 20m / 17m / 15m / 12m / 10m / 6m / 2m /
world wide / zoom to US / zoom to Europe / zoom to North Atlantic

show/hide my last filters

showing spots for spotter call: W3LPL

rows to show: 50

search spot by callsign

de	dx	freq	cq/dx	snr	speed	time
W3LPL	4O3A	14023.0	CQ [LoTW]	14 dB	33 wpm	1213z 09 Apr
W3LPL	PI4DIG	14053.0	CQ	15 dB	24 wpm	1213z 09 Apr
W3LPL	RD3A	14035.0	CQ	22 dB	31 wpm	1213z 09 Apr
W3LPL	K9CM	7037.0	CQ	38 dB	27 wpm	1213z 09 Apr
W3LPL	LZ1YE	14050.0	CQ	19 dB	29 wpm	1213z 09 Apr
W3LPL	HI8A	10106.4	CQ	10 dB	19 wpm	1213z 09 Apr
W3LPL	W1ESE	7007.5	CQ [LoTW]	29 dB	32 wpm	1212z 09 Apr
W3LPL	RK3EEW	14023.6	CQ	20 dB	30 wpm	1212z 09 Apr

Who's Hearing the A71?



160m / 80m / 40m / 30m / 20m / 17m / 15m / 12m / 10m / 6m / 2m /
world wide / zoom to US / zoom to Europe / zoom to North Atlantic

[show/hide my last filters](#)

DX dxcc: A7 - Qatar

rows to show:

[cancel filter selection](#) / [search spot by callsign](#)

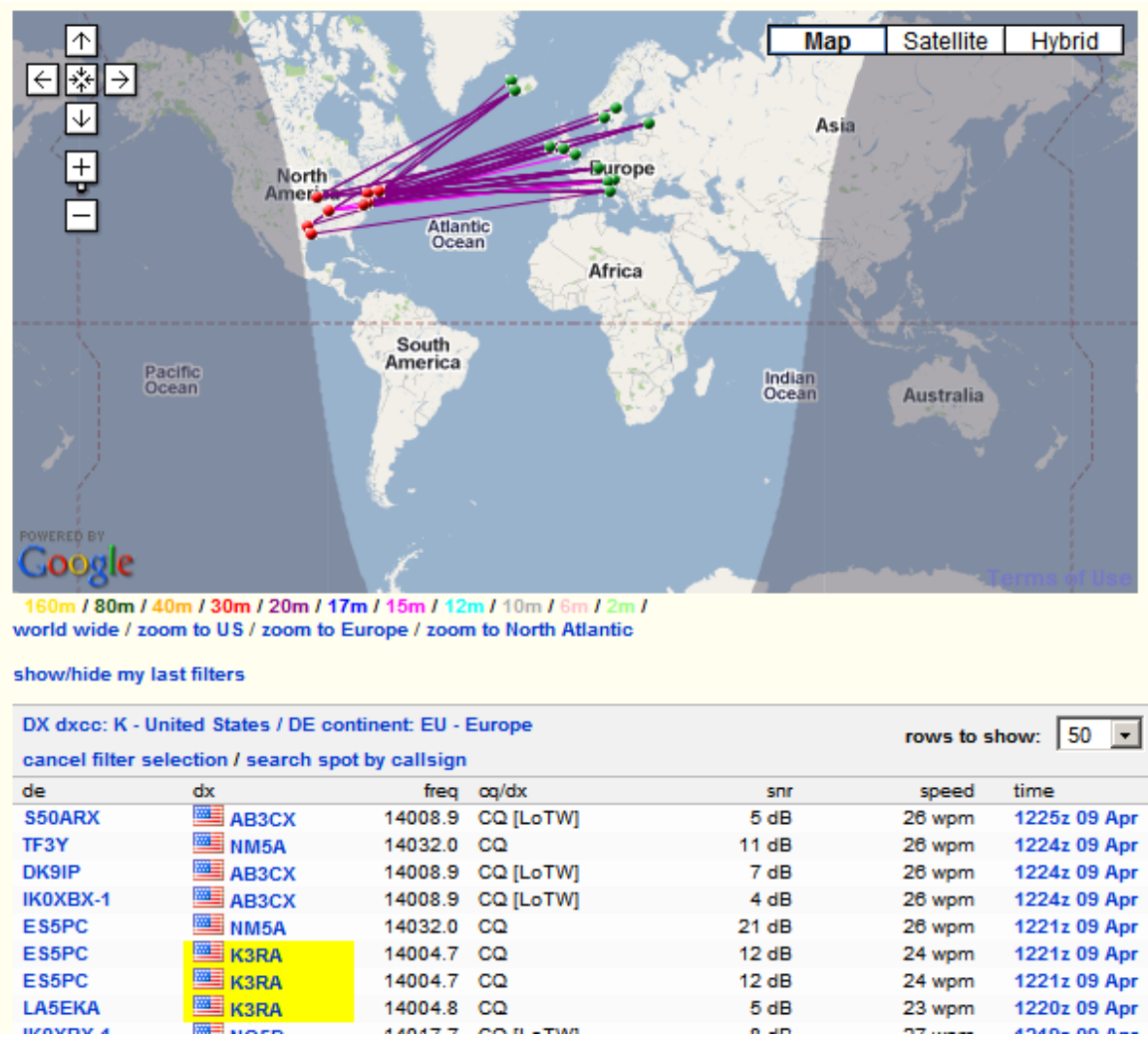
de	dx	freq	cq/dx	snr	speed	time
SM7SJR	A71EM	21016.0	CQ [LoTW]	13 dB	37 wpm	1219z 09 Apr
ES5PC	A71EM	21015.8	CQ [LoTW]	35 dB	38 wpm	1219z 09 Apr
IK3STG	A71EM	21015.8	CQ [LoTW]	8 dB	38 wpm	1219z 09 Apr
OH6CT	A71EM	21015.8	CQ [LoTW]	15 dB	37 wpm	1219z 09 Apr
S50ARX	A71EM	21015.8	CQ [LoTW]	15 dB	34 wpm	1219z 09 Apr
UA9CLB	A71EM	21015.9	CQ [LoTW]	36 dB	36 wpm	1219z 09 Apr
DK9IP	A71EM	21015.8	CQ [LoTW]	16 dB	37 wpm	1219z 09 Apr
JH3PRR	A71EM	21016.0	CQ [LoTW]	24 dB	39 wpm	1218z 09 Apr

How Am I Getting Out?



- Filter for your call as the DX station
- Send sequence recognized as a “CQ”
 - Example: TEST TEST DE N4ZR N4ZR N4ZR
- Watch the screen for results. Collect all US stations heard in Europe, for example, to compare.

How Does my Signal Compare in Europe?

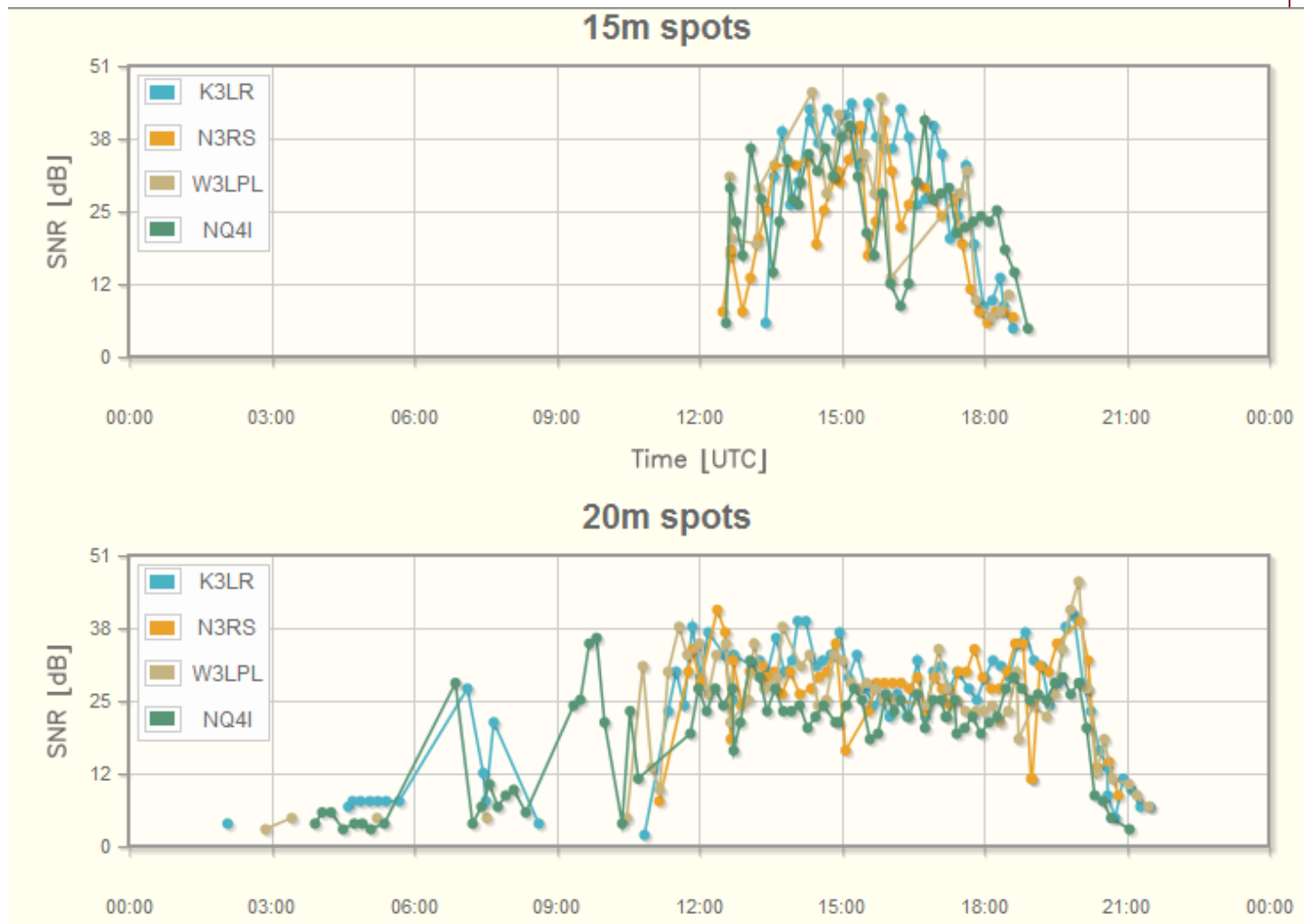


Comparing with others- the Spots Analysis Tool

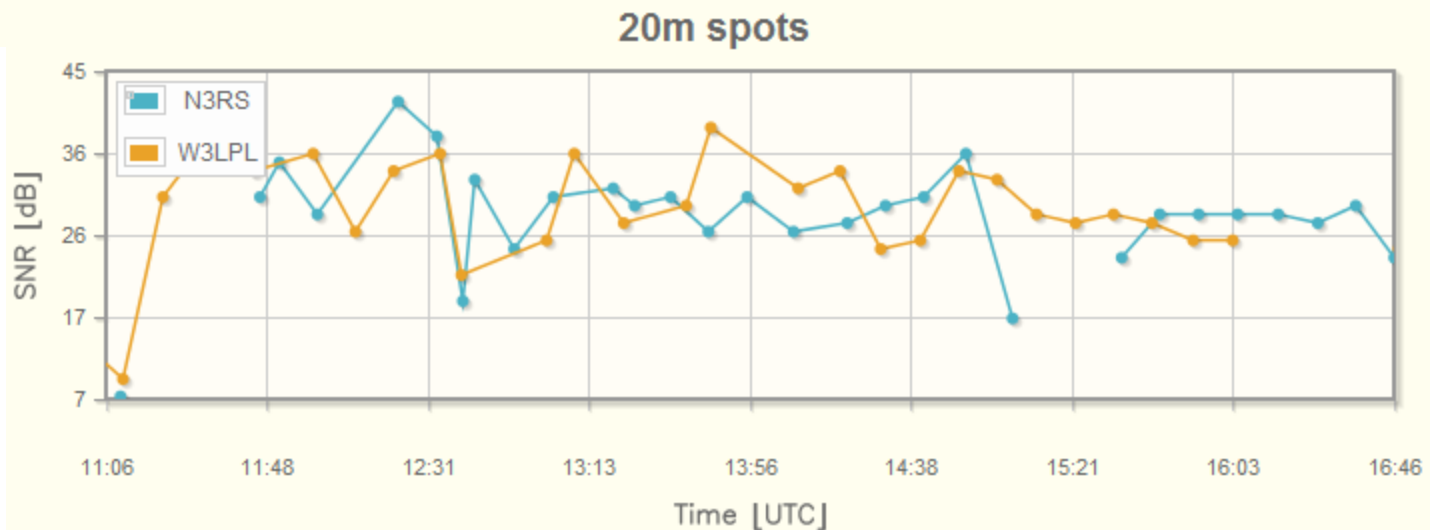
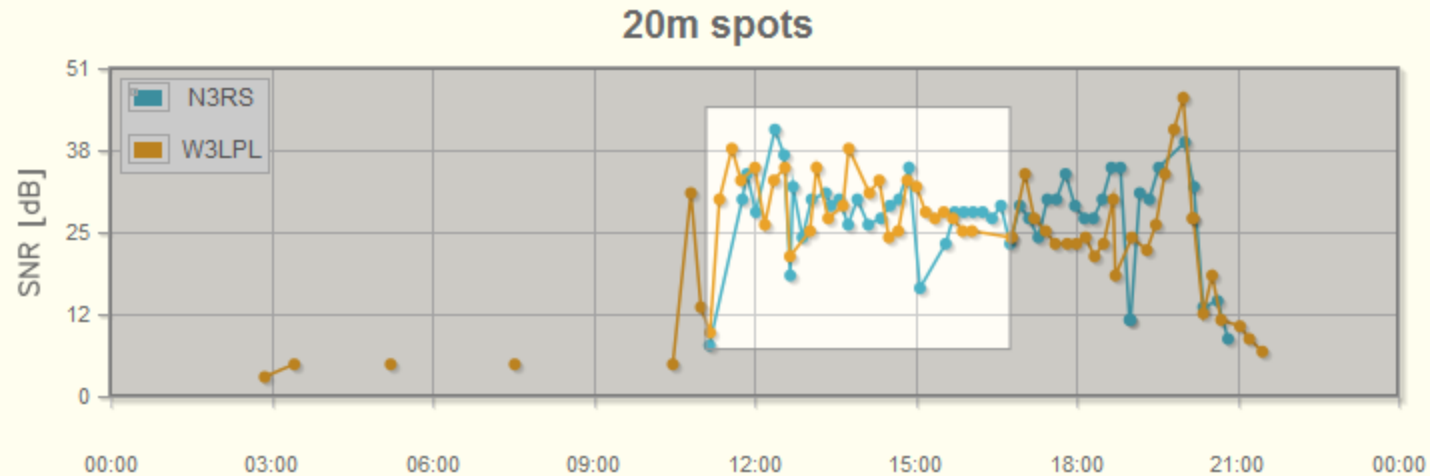


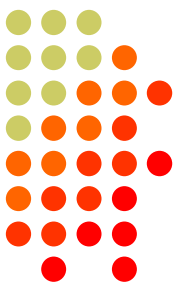
- Developed by F5VIH/SV3SJ
- Select a date, a “reverse beacon” station, and calls to compare.
- The tool will produce graphs showing comparative results for up to 10 stations at a given location, over time.
- Example – ARRL DX CW, first day, K3LR, W3LPL, N3RS, NQ4I

A little crowded?



Zooming in





Roll Your Own

- Download raw data a day at a time
- Open in Excel or MS Access
- Please share your analytical ideas - we can all learn from each other
- Reflectors
 - skimmertalk@contesting.com
 - RBN-OPS@yahoogroups.com

What About Use *During* Contests?



- Because Skimmers spot everything, ideally suited for Unlimited and multi-op contesting
 - S&P rates >150/hour readily attainable when the bands are full
 - Finding odd-ball openings almost assured, with 50+ stations listening



But...

- RBN spot volume reached almost 10 spots per **second** during major contests – will continue to increase.
- The feed contains many duplicate spots

JA4ZRK		9A5MT	14005.0	CQ [LoTW]	9 dB
N7TR		DS5DNO	3512.0	CQ [LoTW]	12 dB
JA4ZRK		DS5DNO	3512.0	CQ [LoTW]	15 dB
JH3PRR		DS5DNO	3512.0	CQ [LoTW]	15 dB
NC7J		VK4SN	14005.2	CQ	10 dB
EI6IZ		R9UT	14027.3	CQ	23 dB
N4ZR		VK4SN	14005.3	CQ	13 dB
ES5PC		VP5/W5CW	18073.2	CQ	29 dB
JH3PRR		OH1RX	21028.3	CQ	23 dB
RN4WA		ZL3TE	14010.0	CQ [LoTW]	5 dB
DK9IP		OH1RX	21028.0	CQ	39 dB
N7TR		W9NGA	7013.5	CQ [LoTW]	51 dB
W0MU		W9NGA	7013.5	CQ [LoTW]	42 dB
NC7J		W9NGA	7013.5	CQ [LoTW]	44 dB
W3UA		W9NGA	7013.6	CQ [LoTW]	11 dB
K3MM		W9NGA	7013.6	CQ [LoTW]	22 dB

How to Use the RBN in a Contest



- Filter **at the node** to meet your needs
 - Spot origin (country, zone, US state, VE province)
- Filter in your logging program
 - Screen out remaining duplicates
 - Select bands, all spots or just new mults

A Unique Tool



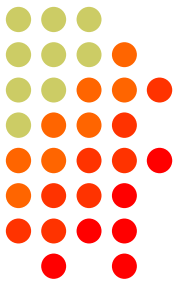
Available - 47 Mults 31 Qs (Basic VFO Control) of 45 total spots					
Mults			Qs		
0	160		0/0		
0	80		0/0		
7	40		6/10		
14	20		10/11		
11	15		6/6		
15	10		9/9		
Call	Freq	Dir	Mode	TS	S/N
UA3D	7022.0	033° #	CW	04-12 115900	02 dB
WB5NUK	7034.8	248° #	CW	04-12 115853	23 dB
DL1LQR	7034.5	047° #	CW	04-12 115852	13 dB
F8DGY	28012.1	055° #	CW	04-12 115838	16 dB
UA3DCZ	7022.0	033° #	CW	04-12 115836	38 dB
W9QB	7044.7	287° #	CW	04-12 115826	18 dB
S52WD	14016.0	051° #	CW	04-12 115824	30 dB
RU4CS	14037.9	032° #	CW	04-12 115823	19 dB
DF4ZY	7025.1	047° #	CW	04-12 115820	03 dB
OH7QR	21058.0	029° #	CW	04-12 115813	20 dB
KI4XH	7022.6	220° #	CW	04-12 115803	11 dB
N4S	14050.0	220° #	CW	04-12 115758	23 dB

The RBN's Future



- Multiple servers and load-balancing to scale for growing demand
- Improved filtering interface for user convenience
- Better analytical tools

The W3LPL-2 Experiment



- Feeding carefully-selected Skimmer spots into the traditional cluster network through custom filtering software
 - Limited in quantity -
 - Carefully checked to ensure no busts
 - Spots limited to list of about 1000 callsigns, with most common excluded
 - Re-spotting interval adjustable by relative rarity

RBN Assets



- <http://reversebeacon.net> – the RBN web site
- <http://reversebeacon.blogspot.com> - the RBN blog
- DXSpider node: telnet.reversebeacon.net
port 7000
- ARCluster node: arcluster.reversebeacon.net
port 7000



Other Resources

- Skimmertalk@contesting.com
- RBN-OPS@yahogroups.com